REMARKS:

Changes have been made to the Brief Summary Of The Invention and Abstract Of The Disclosure sections of the specification, support for which is found, *inter alia*, in originally filed claim 20. Claims 5-19 have been cancelled without prejudice or disclaimer. Claim 21 has been amended. Support for the amendment to claim 21 is found, *inter alia*, in FIG. 7, which is discussed in the specification starting on page 22, line 19, and continuing through page 24, line 4. Claims 20-40 are pending in the application. No new matter has been introduced. Reexamination and reconsideration of the application, as amended, are respectfully requested.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,

HOGAN & HARTSON L.L.P.

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By: _____
Brian D. Martin
Registration No. 47,771
Attorneys for Applicant

500 South Grand Avenue, Suite 1900
Los Angeles, California 90071
Phone: 213-337-6700
Fax: 213-337-6701

Version with markings to show changes made:

In the specification:

Page 2, line 23, through page 9, line 23:

BRIEF SUMMARY OF THE INVENTION

[There are the following technical problems to be solved in the field of the system-on-silicon technique:

(1) The characteristics of a plurality of functional circuits with different functions, which are integrated into one semiconductor chip, need to be exactly measured in tests; and

(2) A plurality of functional circuits with different functions need to be integrated into one semiconductor chip, with their characteristics brought out as much as possible.

The present invention has been made in consideration of the above circumstances, and a first object of the present invention is to provide a semiconductor integrated circuit device, wherein the characteristics of a plurality of functional circuits with different functions, which are integrated into one semiconductor chip, can be exactly measured in tests.

A second object of the invention is to provide a semiconductor integrated circuit device, wherein a plurality of functional circuits with different functions need to be integrated into one semiconductor chip, with their characteristics brought out as much as possible.

A third object of the present invention is to provide a method of testing a semiconductor integrated circuit device, wherein the characteristics of a plurality of functional circuits with different functions, which are integrated into one semiconductor chip, can be exactly measured.

A fourth object of the invention is to provide a semiconductor integrated circuit device wherein the characteristics of a plurality of semiconductor integrated circuits formed on a single wafer can be measured in a test at a time with high precision, with an electrical interference, in particular, an interference between supply voltages, among the semiconductor integrated circuits being suppressed.

A fifth object of the invention is to provide a tester for a semiconductor integrated circuit device wherein static consumption current characteristics of a plurality of semiconductor integrated circuits formed on a single wafer can be measured in a test at a time with high precision.

In order to achieve the first object of the invention, there is provided a semiconductor integrated circuit device having integrated circuits with different functions integrated into one semiconductor chip, the semiconductor integrated circuit device comprising: a semiconductor chip; a separating region, formed in the semiconductor chip, for separating the semiconductor chip into a plurality of integrated circuit formation regions, the separating region being exposed to entire side faces of the semiconductor chip; and integrated circuits formed in the integrated circuit formation regions, respectively, the integrated circuits having different functions, at least one of the integrated circuits performing a function fluctuating a potential of the integrated circuit formation region in which the at least one of the integrated circuits is formed.

In this invention, an integrated circuit operating to fluctuate a potential of an integrated circuit formation region in which the integrated circuit itself is formed is separated from the other integrated circuits by a separating region, so that a fluctuation in potential of the integrated circuit formation region may not be transmitted to the other integrated circuit formation regions. Thereby, the characteristics of a plurality of functional circuits with different functions, which are integrated into one semiconductor chip, can be exactly measured in tests.

The separating region is put in contact with the entire side surface of a semiconductor chip so that a fluctuation in potential of the integrated circuit formation region of the chip may not be transmitted to the integrated circuit formation regions of the other chips. Thereby, eve if a plurality of chips formed on a single wafer are tested at a time, the characteristics of integrated circuits of each chip can be exactly measured.

In order to achieve the second object of the invention, this invention provides a semiconductor integrated circuit device having integrated circuits with different functions integrated into one semiconductor chip, the semiconductor integrated circuit device comprising: a semiconductor chip; a separating region, formed in the semiconductor chip, for separating the semiconductor chip into a plurality of integrated circuit formation regions, the separating region being exposed to entire side faces of the semiconductor chip; and

integrated circuits formed in the integrated circuit formation regions, respectively, the integrated circuits having dedicated power supplies.

In this invention, each of integrated circuits formed on a semiconductor chip is provided with a dedicated power supply, and the dedicated power supplies of the integrated circuits are set

at such values as to bring out the characteristics of the individual integrated circuits as much as possible. Thereby, the integrated circuits with different functions can be integrated into one semiconductor chip, with their characteristics brought out as much as possible.

In order to achieve the third object of the invention, there is provided a method of testing a semiconductor integrated circuit device comprising a semiconductor chip; a separating region, formed in the semiconductor chip, for separating the semiconductor chip into a plurality of integrated circuit formation regions, the separating region being exposed to entire peripheral side faces of the semiconductor chip; and integrated circuits formed in the integrated circuit formation regions, respectively, the integrated circuits having dedicated power supplies, wherein while at least one of the integrated circuits is being tested, power is supplied to only the integrated circuit being tested, and no power is supplied to the other integrated circuits.

In this invention, the dedicated power supplies are turned on/off in accordance with tests of integrated circuits. Thereby, the characteristics of a plurality of functional circuits with different functions, which are mounted on a single semiconductor chip in a hybrid manner, can be exactly measured.

In order to achieve the fourth object, this invention provides a semiconductor integrated circuit comprising device: a semiconductor substrate of a first conductivity type; at least one first well of a second conductivity type, formed in the semiconductor substrate; an integrated circuit formed in the first well; a power supply system including a high-potential power line and a low-potential power line for supplying an operational voltage to the integrated circuit; a bias system for supplying a bias potential to the semiconductor substrate, the bias system including a bias line separated from the high-potential power line and the low-potential power line; a first pad connected to the bias line; a second pad connected to the high-potential power line; and a third pad connected to the low-potential power line.

In this invention, a bias system for applying a bias potential to a semiconductor substrate is separated from power supply systems for supplying operating voltages to integrated circuits, so that the power supply systems of the respective chips formed on a single wafer may not be interconnected via the semiconductor substrate. Thereby, in particular, a problem in which a power ripple of each chip becomes high-frequency wave can be solved, and the characteristics of semiconductor integrated circuit devices (chips) can be measured with high precision.

In order to achieve the fifth object, this invention provides a tester for a semiconductor integrated circuit, the tester comprising: a supply voltage generator, associated with a plurality of semiconductor integrated circuit device chips to be tested at a time, for generating a supply voltage for operating integrated circuits on each semiconductor integrated circuit device chip; a detector for detecting a variation in supply voltage for each semiconductor integrated circuit device chip, while the semiconductor integrated circuit device chips are being tested; a determination device for determining whether the variation in supply voltage detected for each chip falls within a predetermined range of allowance; and a shut-off device for shutting off, when it has been determined that the variation in supply voltage detected for each chip falls outside the predetermined range of allowance, the supply of the supply voltage to the chip with the variation in supply voltage outside the predetermined range of allowance.

In this invention, the shut-off device shuts off the supply of power voltage to a chip which has caused a fluctuation of power voltage outside a predetermined range of allowance, thereby stopping the operation of the chip and preventing a great ripple from occurring in the power supplies of the other chips. Thereby, the static consumption current characteristics of semiconductor integrated circuit devices (chips) can be measured with high precision. Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out in the appended claims.]A semiconductor device according to an aspect of the present invention comprises: a semiconductor substrate of a first conductivity type; at least one first well of a second conductivity type formed in the semiconductor substrate; and at least one second well of the first conductivity type formed in at least one first well, wherein the semiconductor device is composed of semiconductor circuits each formed in at least one first well and at least one second well.

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ABSTRACT OF THE DISCLOSURE

[Functional circuits such as a processor, an SRAM, a DRAM and a flash-EEPROM are mounted on a semiconductor chip. Of these functional circuits, for example, the flash-EEPROM which fluctuates a potential of the semiconductor chip is separated from the other circuits by means of a separating region provided in the semiconductor chip. In addition, the separating region is put in contact with the entire side faces of the semiconductor chip.]A semiconductor device comprises a semiconductor substrate of a first conductivity type, at least one first well of a second conductivity type formed in the semiconductor substrate, and at least one second well of the first conductivity type formed in at least one first well. The semiconductor device is composed of semiconductor circuits each formed in at least one first well and at least one second well.

In the claims:

21. (Amended) A semiconductor device comprising:

a semiconductor substrate of a first conductivity type;

at least one first well of a second conductivity type formed in the semiconductor substrate;

at least one second well of the first conductivity type formed in at least one first well; and

at least one third well of the second conductivity type formed in at least one [second]first well, wherein

the semiconductor device is composed of semiconductor circuits each formed in at least one first well, at least one second well and at least one third well.